

What is claimed is:

1. A communication device, comprising:
at least one communication interface;
a communication interface circuit coupled to the at least one communication interface, wherein the communication interface circuit communicates using a communication protocol, wherein the communication protocol contains an embedded operation channel (EOC) and a hop count;
wherein the communication interface circuit is adapted to send a discovery query and to receive discovery response messages over the EOC of the at least one communication interface; and
wherein the communication interface circuit is adapted to compare a hop count from a discovery response message from a second communication device to a total number of received discovery response messages.
2. The communication device of claim 1, wherein the communication device is a doubler.
3. The communication device of claim 1, wherein the communication device is a terminal communication device.
4. The communication device of claim 1, wherein the communication device is a Global Symmetric High-speed Digital Subscriber Line (G.SHDSL) communication device.
5. The communication device of claim 1, wherein the communication device is adapted to selectively configure the communication interface circuit and the at least one communication interface in response to the received discovery response messages.

- 10028565 "023024
6. The communication device of claim 1, wherein the communication interface circuit is adapted to send a discovery query and to receive discovery response messages over the EOC of a plurality of communication interfaces simultaneously.
 7. The communication device of claim 1, wherein the communication interface circuit is adapted to send a discovery query and to receive discovery response messages over the at least one communication interface upon initialization of the communication device.
 8. The communication device of claim 1, wherein the communication interface circuit is adapted to send a discovery query and to receive discovery response messages over the at least one communication interface upon having the at least one communication interface coupled to an active communication link.
 9. The communication device of claim 1, wherein the communication interface circuit is adapted to send a discovery query and to receive discovery response messages over the at least one communication interface upon receipt of a manual discovery request from a system operator.
 10. The communication device of claim 1, wherein the communication interface circuit is adapted to resend a discovery query if the number of received discovery response messages does not match the hop count from the discovery response message from the second communication device.
 11. The communication device of claim 1, wherein the communication interface circuit is adapted to resend a discovery query if no discovery response messages is received from the second communication device.

12. The communication device of claim 1, wherein the communication interface circuit is adapted to resend a discovery query if the number of received discovery response messages does not match the hop count from the discovery response message from the far-end communication device after a selected waiting period from the time the discovery response message from the far-end communication device was received.

13. A communication system, comprising:
a communication link;
a plurality of communication devices coupled to the communication link, wherein at least two communication devices of the plurality of communication devices are terminal communication devices, and wherein at least one of the plurality of communication devices comprises:
at least one communication interface coupled to the communication link;
a communication interface circuit coupled to the at least one communication interface, wherein the at least one communication interface circuit communicates using a communication protocol, wherein the communication protocol contains an embedded operation channel (EOC) and a hop count;
wherein the communication interface circuit is adapted to send a discovery query to the plurality of communication devices coupled to the communication link and receive discovery response messages over the EOC from the plurality of communication devices; and
wherein the communication interface circuit is adapted to compare a hop count from the discovery response message from one of the at least two terminal communication devices coupled to the communication link to a total number of received discovery response messages.

14. The communication system of claim 13, wherein the at least one communication device is a doubler.

15. The communication system of claim 13, the at least one communication device is a terminal communication device.
16. The communication system of claim 13, wherein the communication system is a High-speed Digital Subscriber Line (HDSL) communication system.
17. The communication system of claim 13, wherein the communication system is a Global Symmetric High-speed Digital Subscriber Line (G.SHDSL) communication system.
18. The communication system of claim 13, wherein the at least one communication device is adapted to selectively configure the communication interface circuit and the at least one communication interface in response to the received discovery response messages.
19. The communication system of claim 13, wherein the communication interface circuit of the at least one communication device is adapted to send a discovery query and to receive discovery response messages over the EOC of a plurality of communication interfaces simultaneously.
20. The communication system of claim 13, wherein the communication interface circuit is adapted to send a discovery query and to receive discovery response messages over the at least one communication interface upon initialization of the at least one communication device.
21. The communication system of claim 13, wherein the communication interface circuit of the at least one communication device is adapted to send a discovery query and to receive discovery response messages over the at least one

communication interface upon having the at least one communication interface coupled to the communication link.

22. The communication system of claim 13, wherein the communication interface circuit of the at least one communication device is adapted to send a discovery query and to receive discovery response messages over the at least one communication interface upon receipt of a manual discovery request from a system operator.
23. The communication system of claim 13, wherein the communication interface circuit of the at least one communication device is adapted to resend a discovery query if the number of received discovery response messages does not match the hop count from the discovery response message from one of the at least two terminal communication devices of the communication system.
24. The communication system of claim 13, wherein the communication interface circuit of the at least one communication device is adapted to resend a discovery query if no discovery response messages is received from one of the at least two terminal communication devices of the communication system.
25. The communication system of claim 13, wherein the communication interface circuit of the at least one communication device is adapted to resend a discovery query when the number of received discovery response messages does not match the hop count from the discovery response message from the far-end communication device of the communication system after a selected waiting period from the time the discovery response message from one of the at least two terminal communication devices was received.

26. A High-speed Digital Subscriber Line (HDSL) communication device, comprising:
 - at least one HDSL communication interface;
 - an HDSL communication circuit coupled to the at least one HDSL communication interface, wherein the HDSL communication circuit communicates using HDSL communication protocol containing an embedded operation channel (EOC) and a hop count;
 - wherein the HDSL communication circuit is adapted to send an HDSL discovery query and to receive HDSL discovery response messages over the EOC through the at least one HDSL communication interface; and
 - wherein the HDSL communication circuit is adapted to compare a hop count from an HDSL discovery response message from a second HDSL communication device to a total number of received HDSL discovery response messages.
27. The HDSL communication device of claim 26, wherein the HDSL communication device further comprises:
 - a processor coupled to the HDSL communication circuit; and
 - a machine-usable storage media coupled to the processor, wherein the processor utilizes discovery firmware stored on the machine-usable storage media to conduct discovery on the HDSL communication interface.
28. The HDSL communication device of claim 26, wherein the HDSL communication device is an HDSL doubler.
29. The HDSL communication device of claim 26, wherein the HDSL communication device is a terminal HDSL communication device.
30. The HDSL communication device of claim 26, wherein the HDSL communication circuit is adapted to send a discovery query and to receive discovery response messages over the EOC of a plurality HDSL communication interfaces

simultaneously.

31. The HDSL communication device of claim 26, wherein the HDSL communication circuit is adapted to send a discovery query and to receive discovery response messages over the at least one communication HDSL interface upon initialization of the HDSL communication device.
32. The HDSL communication device of claim 26, wherein the HDSL communication circuit is adapted to send a discovery query and to receive discovery response messages over the at least one HDSL communication interface upon having the at least one HDSL communication interface coupled to an active HDSL communication link.
33. The HDSL communication device of claim 26, wherein the HDSL communication circuit is adapted to resend a discovery query when the number of received discovery response messages does not match the hop count from the discovery response message from the far-end HDSL communication device.
34. The HDSL communication device of claim 26, wherein the HDSL communication circuit is adapted to resend a discovery query when no discovery response messages are received from the far-end HDSL communication device.
35. A High-speed Digital Subscriber Line (HDSL) communication system, comprising:
an HDSL communication link; and
a plurality of HDSL communication devices coupled to the HDSL communication link, wherein at least two HDSL communication devices of the plurality of HDSL communication devices are terminal HDSL communication devices, and wherein at least one of the plurality of HDSL communication devices comprises:

- at least one HDSL communication interface coupled to the HDSL communication link;
 - an HDSL communication interface circuit coupled to the at least one HDSL communication interface, wherein the at least one HDSL communication interface circuit communicates using an HDSL communication protocol, wherein the HDSL communication protocol contains an embedded operation channel (EOC) and a hop count;
 - wherein the HDSL communication interface circuit is adapted to send a discovery query to the plurality of HDSL communication devices coupled to the HDSL communication link and receive discovery response messages over the EOC from the plurality of HDSL communication devices; and
 - wherein the HDSL communication interface circuit is adapted to compare a hop count from the discovery response message from one of the at least two terminal HDSL communication devices coupled to the HDSL communication link to a total number of received discovery response messages.
- 36. The HDSL communication system of claim 35, wherein the HDSL communication interface circuit is adapted to send a discovery query and to receive discovery response messages over the at least one HDSL communication interface upon initialization of the at least one HDSL communication device.
- 37. The HDSL communication system of claim 35, wherein the HDSL communication interface circuit of the at least one HDSL communication device is adapted to send a discovery query and to receive discovery response messages over the at least one HDSL communication interface when the at least one HDSL communication interface coupled to the HDSL communication link.
- 38. The HDSL communication system of claim 35, wherein the HDSL communication

interface circuit of the at least one HDSL communication device is adapted to resend a discovery query if the number of received discovery response messages does not match the hop count from the discovery response message from one of the at least two terminal HDSL communication devices of the HDSL communication system.

39. The HDSL communication system of claim 35, wherein the HDSL communication interface circuit of the at least one HDSL communication device is adapted to resend a discovery query if no discovery response messages is received from one of the at least two terminal HDSL communication devices of the communication system.
40. A method of operating a communication device, comprising:
sending a discovery request on an embedded operation channel (EOC);
receiving at least one discovery response message from at least one other communication device, wherein at least one response message of the at least one discovery response message is a discovery response from a terminal communication device;
extracting a hop count from the discovery response from the terminal communication device; and
comparing the number of discovery response messages to a hop count of the discovery response message from the terminal communication device to determine if discovery is complete.
41. The method of claim 40, further comprising:
storing discovery routines on a machine readable storage medium.
42. The method of claim 40, further comprising:
selectively configuring the communication device in response to the received at

least one discovery response messages.

43. The method of claim 40, wherein sending a discovery query and receiving at least one discovery response message further comprises sending a discovery query and receiving at least one discovery response message upon initialization of the communication device.
44. The method of claim 40, wherein sending a discovery query and receiving at least one discovery response message further comprises sending a discovery query and receiving at least one discovery response message upon coupling the communication device to a communication link.
45. The method of claim 40, wherein sending a discovery query and receiving at least one discovery response message further comprises sending a discovery query and receiving at least one discovery response message upon receipt of a manual discovery request from a system operator.
46. The method of claim 40, further comprising:
resending a discovery query when the number of received discovery response messages does not match the hop count of the discovery response message from the terminal communication device.
47. The method of claim 40, further comprising:
resending a discovery query if no discovery response messages are received from the terminal communication device.
48. The method of claim 40, further comprising:
resending a discovery query if the number of received discovery response messages does not match the hop count of the discovery response message from the

terminal communication device after a selected waiting period from the time the discovery response message from the terminal communication device was received.

49. A method of operating a communications system, comprising:
transmitting a discovery request from a first communication device on an
embedded operation channel (EOC);
receiving at least one discovery response message from the at least one second
communication device, wherein at least one response message of the at least
one discovery response message is a discovery response from a terminal
communication device;
extracting a hop count from the discovery response from the terminal
communication device; and
determining if discovery is complete by comparing the number of discovery
response messages to a hop count from the discovery response message of the
terminal communication device.
50. The method of claim 49, further comprising:
selectively configuring the first communication device in response to the received
at least one discovery response messages.
51. The method of claim 49, wherein transmitting a discovery query and receiving at
least one discovery response message further comprises transmitting a discovery
query and receiving at least one discovery response message upon initialization of
the first communication device.
52. The method of claim 49, wherein transmitting a discovery query and receiving at

least one discovery response message further comprises transmitting a discovery query and receiving at least one discovery response message upon coupling the first communication device to a communication link.

53. The method of claim 49, wherein transmitting a discovery query and receiving at least one discovery response message further comprises transmitting a discovery query and receiving at least one discovery response message upon receipt of a manual discovery request from a system operator.
54. The method of claim 49, further comprising:
re-transmitting a discovery query when the number of received discovery response messages does not match the hop count from the discovery response message from the terminal communication device.
55. The method of claim 49, further comprising:
re-transmitting a discovery query when no discovery response messages are received from the terminal communication device.
56. The method of claim 49, further comprising:
re-transmitting a discovery query when the number of received discovery response messages does not match the hop count from the discovery response message from the terminal communication device after a selected waiting period from the time the discovery response message from the terminal communication device was received.
57. A method of operating a High-speed Digital Subscriber Line (HDSL) communication device, comprising:
sending a discovery request on an embedded operation channel (EOC) of an HDSL communication link coupled to the HDSL communication device;

receiving at least one discovery response message from at least one other HDSL communication device coupled to the HDSL communication link, wherein at least one response message of the at least one discovery response messages is a discovery response from a terminal HDSL communication device of the HDSL communication link; and
comparing the number of discovery response messages to a hop count from the discovery response message from the terminal HDSL communication device to determine if discovery is complete.

58. A method of operating a High-speed Digital Subscriber Line (HDSL) communication system, comprising:
transmitting a discovery request from a first HDSL communication device on an embedded operation channel (EOC) of an HDSL communication link coupled to the first HDSL communication device and at least one second HDSL communication device;
receiving at least one discovery response message from the at least one second HDSL communication device, wherein at least one response message of the at least one discovery response messages is a discovery response from a terminal HDSL communication device of the HDSL communication link; and
determining if discovery is complete by comparing the number of discovery response messages to a hop count from the discovery response message from the HDSL terminal communication device.
59. A machine-usable medium having machine-readable instructions stored thereon for execution by a processor of a communication device to perform a method comprising:
sending a discovery request on an embedded operation channel (EOC) of a communication link coupled to the communication device;
receiving at least one discovery response message from at least one other

communication device coupled to the communication link, wherein at least one response message of the at least one discovery response messages is a discovery response from a terminal communication device of the communication link; and
comparing the number of discovery response messages to a hop count from the discovery response message from the terminal communication device to determine if discovery is complete.